

Office Action Summary

Application No.

09/653,096

Applicant(s)

POWELL ET AL.

Examiner

DUNG A LE

Art Unit

2818

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on 14/04/2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☐ Claim(s) 1-41 is/are pending in the application.
- 4a) Of the above claim(s) 1-25 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☐ Claim(s) 26-41 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 4.
- 4) ☐ Interview Summary (PTO-413) Paper No(s) _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

DETAILED ACTION

Election/Restriction

Examiner confirms that Applicants elected to prosecute Claims 26- 41 and have withdrawn Claims 1-25 (method claims) without prejudice.

Oath/Declaration

The oath/declaration filed on 8/31/2001 is acceptable.

Information Disclosure Statement

This office acknowledges of the following items from the Applicant:

Information Disclosure Statement (IDS) filed on 11/14/2000 and made of record as Paper No. 4. The references cited on the PTOL 1449 form have been considered.

Specification

The specification is objected to for the following reason:

The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed (see MPEP § 606.01).

A new abstract is required that is clearly indicative the invention to which the claims are directed. Note that, the claims are directed to semiconductor device not a method of making a semiconductor device.

The specification has been checked to the extent necessary to determine the presence of all possible minor errors. However, the applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

Claim Objections

Claim 39 is objected to because of the following informalities:.

In claim 39, line 19, "P-Si" is requested that Applicants spell out so as to avoid any possible confusion as to the meaning of this term. Appropriate correction is required.

Claim Rejections

Claims: 26-30

Claims 26-29 are rejected under 35 USC 102 (e) as being anticipated by Huang et al. (6291288).

Huang et al. disclose a semiconductor device comprising:

a substrate 100 having at least one semiconductor layer (col 3, line 30);

a silicon-containing dielectric layer 130a formed over the substrate.

an electrode 150 formed over the silicon-containing dielectric layer 130a.

Huang et al. do not disclose "a silicon-containing dielectric layer formed by reacting silicon atoms with a reactive agent " in claim 26. However, the limitation

"reacting silicon atoms with a reactive agent." is taken to be a product by process limitation and consider non-limitation. In a product-by-process claim, it is the patentability of the claimed product and not of the recited process steps which must be established. Therefore, when the prior art discloses a product which reasonably appears to be identical with or only slightly different than the product claimed in a product-by process claim, a rejection based on sections 102 or 103 is fair. The Patent Office is not equipped to manufacture products by a myriad of processes put before it and then obtain prior art product and make physical comparisons therewith. In re Brown, 173 USPQ 685 (CCPA 1972). Also, a product by process claim directed to the product per se, no matter how actually made, In re Hirao, 190 USPQ I S at 17 (footnote 3). See In re Fessman, 180 USPQ 324, 326 (CCPA 1974); In re Marosi et al., 218 USPQ 289, 292 (Fed. Cir. 1983); and particularly In re Thorpe, 227 USPQ 964, 966 (Fed. Cir. 1985), all of which make it clear that it is the patentability of the final structure of the product "gleaned" from the process steps, which must be determined in a " product by process" claim, and not the patentability of the process. See also MPEP 2113. Moreover, an old and obvious product produced by a new method is not a patentable product, whether claimed in "product by process" claims or not.

Regarding claims 27 and 28, the silicon-containing dielectric layer is vapor deposited from hexamethyldisilazane and the silicon containing dielectric layer is vapor deposited from tetramethyldisilazane (col 4, line 3-10).

Regarding claim 29, the silicon-containing dielectric layer is oxynitride (col 4, line 32).

Claim 30 is rejected under 35 U.S.C. 103 (a) as being unpatentable over Huang et al. (6291288) and the remark.

Huang et al. show that the electrode 150 but fail to show it is comprised of metal silicides. It would have been obvious to one having ordinary skill in the art at the time the invention was made to form the electrode is made of metal silicides is commonly used to enhance the conductivity of the device, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. In re Leshin, 125 USPQ 416.

Claims: 31-32

Claims 31 and 32 are rejected under 35 U.S.C. 103 (a) as being unpatentable over Huang et al. (6291288) and the remark.

Huang et al. disclose the claimed structure but fail to disclose source and drain of the structure. Applying the structure of Huang et al. in a semiconductor device having source, drain and gates would have been obvious because it is intended use.

Regarding claim 32, a second dielectric layer 140 vapor deposited over the one or more silicon-containing dielectric layers.

Claims: 33-36

Claims 33 -36 are rejected under 35 U.S.C. 103 (a) as being unpatentable over Huang et al. (6291288) in view of Vaartstra et al. (6197628).

Huang et al. disclose a semiconductor device comprising:

a first conductive layer 100;

a silicon-containing dielectric layer 120 formed over the first conductive layer 100 by reacting silicon atoms of a deposited material with a reactive agent; and

a second conductive layer 150 formed over the silicon-containing dielectric layer 120..

Huang et al. do not disclose the claimed structure over a substrate having at least one semiconductor layer. Vaartstra et al. teach a substrate 181 having at least one semiconductor layer (col 9, line 21- 25, fig. 5).

However, the formation the Huang's structure over the Vaartstra's substrate having at least one semiconductor layer is well-known to one of ordinary skill in the art of making semiconductor devices.

Regarding claim 34, Huang also disclose a second dielectric layer 130 formed over the silicon-containing dielectric layer 120 and below the second conductive layer 150.

Regarding claims 35 and 36 the second dielectric layer 130 is comprised of a material selected from the group comprising Si_3N_4 , BST, and PZT (Huang , col 4, line 4).

And the second dielectric layer is comprised of a material selected from the group consisting of Si_3N_4 , BST, PZT, Al_2O_3 , TiO_x and WO_x (Huang , col 4, line 4).

Claims: 37-40

Claim 37 is rejected under 35 U.S.C. 103 (a) as being unpatentable over Huang et al. (6291288) in view of Vaartstra et al. (6197628) and further in view of the remark.

Huang et al. disclose asemiconductor device comprising:

an electrode 100;

a silicon-containing dielectric layer 120 formed over the electrode 100; and

a second dielectric layer 130 formed over the silicon-containing dielectric.

Huang et al. do not disclose the claimed structure over a substrate having at least one semiconductor layer. However, Vaartstra et al. teach a substrate 181 having at least one semiconductor layer (col 9, line 21- 25, fig. 5).

Accordingly, the formation the Huang's structure over the Vaartstra's substrate having at least one semiconductor layer is well-known to one of ordinary skill in the art of making semiconductor devices.

Huang et al. do not disclose "a silicon-containing dielectric layer formed by reacting silicon atoms with a reactive agent " in claim 37. However, the limitation "reacting silicon atoms with a reactive agent." is taken to be a product by process limitation and consider non-limitation. In a product-by-process claim, it is the

patentability of the claimed product and not of the recited process steps which must be established. Therefore, when the prior art discloses a product which reasonably appears to be identical with or only slightly different than the product claimed in a product-by-process claim, a rejection based on sections 102 or 103 is fair. The Patent Office is not equipped to manufacture products by a myriad of processes put before it and then obtain prior art product and make physical comparisons therewith. In re Brown, 173 USPQ 685 (CCPA 1972). Also, a product by process claim directed to the product per se, no matter how actually made, In re Hirao, 190 USPQ I S at 17 (footnote 3). See In re Fessman, 180 USPQ 324, 326 (CCPA 1974); In re Marosi et al., 218 USPQ 289, 292 (Fed. Cir. 1983); and particularly In re Thorpe, 227 USPQ 964, 966 (Fed. Cir. 1985), all of which make it clear that it is the patentability of the final structure of the product "gleaned" from the process steps, which must be determined in a "product by process" claim, and not the patentability of the process. See also MPEP 2113. Moreover, an old and obvious product produced by a new method is not a patentable product, whether claimed in "product by process" claims or not.

Regarding claim 39, Huang teaches the electrode 150 is comprised of a material selected from the group comprising P-Si, SiGe and metal (col 4. line 41).

Claims 38 and 40 are rejected under 35 U.S.C. 103 (a) as being unpatentable over Huang et al. (6291288) in view of Vaartstra et al. (6197628) and further in view of the remark.

Huang et al. in view of Vaartstra et al. show the electrode 150 but fail to show it is comprised of metal. It would have been obvious to one having ordinary skill in the art at the time the invention was made to form the electrode is made of metal is commonly used to enhance the conductivity of the device, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. In re Leshin, 125 USPQ 416.

Regarding claim 40, Huang et al. teach the second dielectric is made of oxide, but fails to teach the second dielectric layer is comprised of Ta₂O₅. (Mr A does not explicitly teach that the P-type silicon substrate contains carbon)

It is known in the art that the dielectric layer is comprised of Ta₂O₅ is commonly used to form the desirable dielectric layer having high dielectric constant.

Claim: 41

Claim 41 is rejected under 35 U.S.C. 103 (a) as being unpatentable over Huang et al. (6291288) and the remarks.

Huang et al. disclose the claimed structure but fail to disclose the claimed structure connecting to computer system comprising at least one processor, a system and memory device; source and drain of the structure. Applying the structure of Huang et al. in a semiconductor device having source, drain and gates, connecting to computer system would have been obvious because it is intended use.

When responding to the office action, Applicants' are advice to provide the examiner with the line numbers and page numbers in the application and/or references cited to assist the examiner to locate the appropriate paragraphs.

A shortened statutory period for response to this action is set to expire 3 (three) months and 0 (zero) day from the day of this letter. Failure to respond within the period for response will cause the application to become abandoned (see M.P.E.P 710.02(b)).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dung A. Le whose telephone number is 703-306-5797. The examiner can normally be reached on Monday-Friday 8:00am-5: 30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Nelms can be reached on 703-308-4910. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7722 for regular communications and (703) 308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

Dung A. Le

DETAILED ACTION

Election/Restrictions

Claims 1- 41 are pending in this application.

1. Restriction to one of the following inventions is required under 35 U.S.C. 121:

Group I. Claims 26-40, drawn to a semiconductor device, classified in class 257, subclass 304.

Group II. Claims 1-25, drawn to process of making a semiconductor device, classified in class 438, and subclass 405.

Group III. Claim 41, drawn to computer system

2. The inventions are distinct, each from the other because of the following reasons:

Inventions II and I are related as process of making and product made. The inventions are distinct if either or both of following can be shown: (1) that the process as claimed can be use to make other and materially different product or by hand, or (2) that process as claimed can be made by another and materially different process. (MPEP § 806.05(f)). In the instance case unpatentabilities of the group I invention would not necessarily imply unpatentability of the group II invention, since the device of the group I invention could be made by the processes materially different from those of the group II invention.

3. Because these inventions are distinct for the reasons given above and have acquired a separate status in the art as shown by their different classification, the fields of search are not co-extensive. Therefore, separate examination would be required and restriction for examination purposes as indicated is proper.
4. Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the

currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a diligently filed petition under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(h).

5. Any inquiry concerning this communication on earlier communications from the examiner should be directed to Dung A. Le whose telephone number is (703) 306- 5797. The examiner can normally be reached on Monday-Friday from 7:30 AM to 5:00 PM. The examiner's supervisor, David Nelms can be reached on (703) 308-4910. The fax phone number for the organization where this application or proceeding is assigned is (703) 308-7724.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956

Dung A. Le

U.S. DEPARTMENT OF COMMERCE
PATENT AND TRADEMARK OFFICE

EXAMINER'S CASE ACTION WORKSHEET

Application No. 09/653,096		Legal Instrument Examiner
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CHECK TYPE OF ACTION

DATE OF COUNT

<input checked="" type="checkbox"/> Non-Final Rejection	<input type="checkbox"/> Restriction/ Election Only	<input type="checkbox"/> Final Rejection
<input type="checkbox"/> Ex Parte Quayle	<input type="checkbox"/> Allowance	<input type="checkbox"/> Advisory Action
<input type="checkbox"/> Examiner's Answer	<input type="checkbox"/> Reply Brief Noted	<input type="checkbox"/> Non-Entry of Late Paper
<input type="checkbox"/> Defective Notice of Appeal or Defective Appeal Brief	<input type="checkbox"/> Interference SPE _____ (Approval for Disposal)	<input type="checkbox"/> Suspension SPE _____ (initial)
<input type="checkbox"/> Allowance After Examiner's Answer	<input type="checkbox"/> SIR Disposal (use only after FAOM)	<input type="checkbox"/> Post-Allowance Communication
<input type="checkbox"/> Miscellaneous Office Letter (With Shortened Statutory Period Set)	<input type="checkbox"/> Notice of Non-Responsive Amendment (With One Month Time Period set)	<input type="checkbox"/> Miscellaneous Office Letter (No Response Period Set)
<input type="checkbox"/> Letter Requiring Formal Drawings	<input type="checkbox"/> Supplemental Action (Excluding Examiner's Answer)	<input type="checkbox"/> Response to a Rule 312 Amendment
<input type="checkbox"/> Restart Time Period (e.g., Missing References)	<input type="checkbox"/> Interview Summary	<input type="checkbox"/> Authorization to Change Previous Office Action SPE: _____ (Initial)
<input type="checkbox"/> Abandonment	<input type="checkbox"/> Express Abandonment Date: _____.	<input type="checkbox"/> Abandonment After Examiner's Answer

Examiner's Name: DUNG A LE

AU: 2818